IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application for:

Kapil D. Singh

Application No.: 09/239,578

Filed: January 28, 1999

For: Method and Apparatus for Reusing Subparts of One Mechanical Design for Another Mechanical Design.

Examiner: Sharon, Ayal I.

Art Group: 2123

Commissioner for Patents
Washington, DC 20231

Appellant's Brief Under 37 C.F.R. §1.192 In Support Of
Appellant's Appeal To The Board Of Patent Appeals And Interferences

Dear Sir:

The Appellant hereby submits this Brief in support of their appeal from a final

decision by the Examiner, mailed October 22, 2002 in the above referenced case.

Appellant respectfully requests consideration of this appeal by the Board of Patent

Appeals and Interferences for allowance of the present patent application.

(1) Real Party In Interest

The real party in interest is the Autodesk Corporation, a corporation of Delaware,

having its primary place of business at 111 McInnis Parkway, San Rafael, CA 94903.

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(2) Related Appeals And Interferences

To the best of Appellant's knowledge, there are no appeals or interferences related to the present appeal which will directly affect, be directly affected by, or have a bearing on the Board's decision.

(3) Status Of The Claims

Claims 1-26 were rejected in the Final Office Action dated October 22, 2002. Claims 1-26 remain pending herein and are reproduced, as pending, in Appendix A.

(4) Status of Amendments

In response to a Final Office Action dated October 22, 2002, Appellant filed an amendment and response on January 21, 2003.

In the amendment and response of January 21, 2003, corrections were made to repair previously undetected informalities in the specification. It is not clear if the Examiner has entered these amendments. No claim amendments have been made since the mailing date of the final rejection.

(5) Summary of the invention

Referring to Figure 1, a modeler **102** models mechanical designs (hereinafter simply designs) while a browser **104** facilities display of the modeled designs. **See page 6, lines 7-9.** Modeler **102** models designs **108a-108b** employing dependant graphs **110a-110b** and using data **106a-106b** suitably organized for the dependant graph approach. **See page 6, lines 10-12.**

Figure 4 contains a flow diagram illustrating the operational flow of modeler **102** for facilitating reuse of a subpart of one design in another design. As illustrated in

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Figure 4, modeler **102** determines whether the inputs provided to it **402** (e.g. by way of browser **104** as discussed in relation to Figure 3, **See page 8 lines 13-25**) are associated with the identification of a subpart of a source design to be reused in a target design or with the identification of a point or an area of a target design in which a subpart of a source design is to be inserted **404**. **Page 10 lines 7-15**.

If it is determined that the inputs are associated with a subpart of a source design to be reused in a target design, it is further determined if the inputs provided reference the dependant graph of the source design or whether the inputs provided reference the source design display itself **406**. If the inputs are associated with the source design display itself, the modeler first identifies dependent graph nodes directly associated with the selected subpart of the source design display **408**. **See Page 10, lines 16-22**.

Additional nodes, nodes upon which the identified dependent graph nodes are dependent, along with the arcs linking them, are identified **408**. **See Page 10, lines 22-24**. Once all the nodes and arcs are identified for the selected subpart to be reused, the modeler replicates the sub-graph **412**. **See page 11, lines 4-6**.

Having replicated the sub-graph, the insertion point in the dependent graph of the target design is determined **414-416**. **See page 11, lines 9-13**. The modeler then attaches the replicated sub-graph to the target design's dependent graph and then updates the updated graph's design display **418**. **See page 11, lines 14-17**.

A similar procedure is performed if the identified inputs are of a target design in which a subpart of a source design is to be inserted. **See page 11 line 18 – page 12 line 15**.

(6) Issues Presented

I. Whether claims 1-26 contain subject matter which, under 35 U.S.C. §112, first

paragraph, is described in the specification in such a way as to enable one skilled in

the art to make or use the invention.

II. Whether claims 1-7 and 25-26 are patentable under 35 U.S.C. §102 over Ansaldi.

III. Whether claims 1-2 and 25-26 are patentable under 35 U.S.C. §102 over Zeid.

IV. Whether claims 8-24 are patentable under 35 U.S.C. §103 over Ansaldi in view of

Official Notice.

V. Whether claims 8 and 16 are patentable under 35 U.S.C. §103 over Zeid in view of

Official Notice.

(7) Grouping of claims

For purposes of this appeal, based on the above listed grounds of rejection, the

claims stand or fall together as follows:

Issue I   Claims 1, 6-8, 13-16, 21-23, and 25-26 stand or fall together as
           Claim Group I.
           Claims 2-5, 9-12 and 17-20 stand or fall together as Claim Group II.

Issue II   Claims 1-7 and 25-26 stand or fall together as Claim Group III.

Issue III   Claims 1-2 and 25-26 stand or fall together as Claim Group IV.

Issue IV   Claims 8-24 stand or fall together as Claim Group V.

Issue V   Claims 8 and 16 stand or fall together as Claim Group VI.

(8) Arguments

Issue I - Claim Group I

Rejection of claims 1-26 under 35 U.S.C. §112, first paragraph was improper because "replicating a sub-graph" and "merging the replicated sub-graph" are adequately discussed in the specification.

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Claim 1 was rejected under 35 U.S.C. §112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. In particular, the Examiner reasoned that the limitations *"replicating a sub-graph"* and *"merging the replicated sub-graph..."* were not adequately discussed in the specification.

Following Appellant's response to the initial rejection, the Examiner states that the Appellant has not provided references in the specification to refute the Examiner's rejection. However, as stated in the first response, Examiner's initial rejection did not meet the initial burden and was, thus, inadequate. The Examiner has the initial burden to establish a reasonable basis to question the enablement provided for the claimed invention. *In re Wright*, 999 F.2d 1557, 1562, 27 USPQ2d 1510, 1513 (Fed. Circ. 1993). **Factors, reasons, and evidence** that lead the Examiner to conclude that the specification fails to teach how to make and use the claimed invention without undue experimentation should be explained. This can be done by making specific findings of fact, supported by the evidence, and then drawing conclusions based on these findings of fact. MPEP §2164.04.

In the present case, with respect to all rejections based on §112, first paragraph related to limitations *"replicating a sub-graph"* and *"merging the replicated sub-graph..."*, the Examiner states simply "However, this limitation is not adequately discussed in the specifications [sic]". A conclusuory statement such as this cannot be said to rely on factors, reasons and evidence that lead the Examiner to conclude that

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the specification fails to teach how to make and use the claimed inventions without undue experimentation.

Nevertheless, in furtherance of the Appellant's position that the limitations ***"replicating a sub-graph"*** and ***"merging the replicated sub-graph..."*** are adequately discussed in the specification, Appellant submitted a declaration under 37 C.F.R. §1.132 related to enablement of such claim elements. A copy of this declaration is included in Appendix B. It is well settled by the court that specifications with enough information to allow one ordinarily skilled in the art to practice the present invention without undue experimentation are deemed "enabling" in compliance with §112, first paragraph. *In re Wands*, 858 F.2d 731, 737, 8 USPQ2d 1400, 1404 (Fed. Cir. 1988). Appellant respectfully submits that the limitations of claim 1 are described in the specification using language and terminology at a level that is consistent with the manner persons skilled in the relevant art present their work. Consequently, others skilled in the art, upon reading the specification, will be able to practice the invention described, including the above mentioned limitations rejected under 35 U.S.C. §112, first paragraph, without undo experimentation. Appellant respectfully submits that more detailed disclosure is unnecessary for one ordinarily skilled in the art to practice the present invention without undue experimentation. In support of Appellant's position, Appellant submitted a declaration by Mark Lambert, a person ordinarily skilled in the art, attesting to the fact that he is able to practice the present invention without further experimentation. In light of the forgoing, Appellant respectfully submits that claim 1 complies with 35 U.S.C. § 112, first paragraph.

Thus, for at least the reasons set forth above, Appellant respectfully submits that the limitations of claim 1 is described in the specification using languages and terminologies at a level that is consistent with the manner persons skilled in the relevant art present their works to one another, thereby satisfying at least the enablement requirements of 35 U.S.C. §112, first paragraph.

Claims 8, 16, 25 and 26 are independent claims containing substantially the same limitations as claim 1, specifically substantially similar limitations to limitations *"replicating a sub-graph"* and *"merging the replicated sub-graph..."*. Additionally, these claims have also been rejected under 35 U.S.C. §112 for the same reasons as that of claim 1. Appellant respectfully submits that for at least the reasons submitted above with respect to claim 1, claims 8, 16, 25 and 26 are also properly enabled by the specification. Claims 2-7, 9-15 and 17-24 depend from claims 1, 8 and 16 respectively, thus, for at least the reasons discussed above with respect to claims 1, 8 and 16, Appellant respectfully submits that claims 2-7, 9-15 and 17-24 are properly enabled with respect to the above mentioned limitations.

Issue I - Claim Group II

Rejection of claims 2-5, 9-12 and 17-20 under 35 U.S.C. §112, first paragraph was improper because "identifying the sub-graph for replication" is adequately discussed in the specification.

Claim 2 was additionally rejected under 35 U.S.C. §112, first paragraph, as containing further subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. In particular, the Examiner reasoned that the limitation *"identifying the sub-graph for replication"* was not adequately

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discussed in the specification. Specifically, the Examiner states that the specification "does not enable one of ordinary skill in the art as to how to implement 'identifying the sub-graph for replication'".

Assuming, arguendo, that the above referenced statement meets the Examiner's initial burden, as discussed above, Appellant respectfully submits that the paragraph beginning on page 10, line 16 and continuing through page 11, line 17 discloses how to identify the sub-graph for replication. If a portion of the design is selected, vis-à-vis a portion of the design's dependant graph, then the nodes of the dependant graph directly associated with the selected portion of the design are determined (Fig 4, item **408**, page 10, lines 22-23). Note that if one has selected a portion of the dependant graph instead of the dependant graph's design, implicitly one has already identified the directly associated nodes as these nodes are, by definition, selected. After having this set of directly associated nodes, the modeler determines the dependant graph nodes dependant, directly and indirectly, on these identified nodes by tracing the graph (Fig 4, item **410**, page 10 line 24 through page 11 line 1). Tracing techniques (known in the art) are used to systematically follow the linking arcs to the nodes upon which the directly associated nodes are dependant (page 11 lines 1 through 4). Thus, Appellant respectfully submits that the limitation of how to implement 'identifying the sub-graph for replication' is adequately described to enable one skilled in the art to practice the invention.

Additionally, Appellant has provided a statement, from a person ordinarily skilled in the art, that the specification provides a person ordinarily skilled in the art with sufficient disclosure to be able to practice the present invention, without undue

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experimentation. Specifically, a statement has been provided from Mark Lambert, an engineer skilled in the art, that the specification provides sufficient information for a person to be able to determine "how" to identify the sub-graph for replication.

Thus, for at least the reasons set forth above, Appellant respectfully submits that the limitations of claim 2 is described in the specification using languages and terminologies at a level that is consistent with the manner persons skilled in the relevant art present their works to one another, thereby satisfying at least the enablement requirements of 35 U.S.C. §112, first paragraph.

Claims 9 and 17 are independent claims containing substantially the same limitations as claim 2, specifically substantially similar limitations to limitations *"identifying the sub-graph for replication"*. Resultantly, these claims have also been rejected under 35 U.S.C. §112 for the same reasons as that of claim 2. Appellant respectfully submits that for at least the reasons submitted above with respect to claim 2, claims 9 and 17 are also properly enabled by the specification. Claims 3-5, 10-12 and 18-20 depend from claims 2, 9, and 17 respectively, and thus, for at least the reasons discussed above with respect to claims 2, 9 and 17, Appellant respectfully submits that claims 3-5, 10-12 and 18-20 are properly enabled with respect to the above mentioned limitations.

Issue I - Claim 24

Rejection of claims 24 under 35 U.S.C. §112, first paragraph was improper because "a first and second processor communicatively coupled to each other to correspondingly execute the first and second plurality of programming instructions" is adequately discussed in the specification.

Claim 24 was rejected under 35 U.S.C. §112, first paragraph, as containing further subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. In particular, the Examiner reasoned that the limitation "*a first and second processor communicatively coupled to each other to correspondingly execute the first and second plurality of programming instructions*" was not adequately discussed in the specification.

Appellant respectfully asserts that the limitations of "a first and second processor communicatively coupled to each other to correspondingly execute the first and second plurality of programming instructions" is adequately discussed to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. First, Appellant respectfully asserts that the Examiner has not met the initial burden establishing a reasonable basis to question the enablement. As previously discussed, Factors, reasons, and evidence that lead the Examiner to believe that *a first and second processor communicatively coupled to each other to correspondingly execute the first and second plurality of programming instructions* is not enabling, must be provided.

Second, Examiner states that the arguments of counsel cannot take the place of evidence in the record. However, Appellant proffered evidence that it was well known that as early as the 1980's a multi-processor super computer was developed by Cray, Inc. of Seattle, Washington, known as Cray X-MP™. In 1988, Cray Research introduced the Cray Y-MP®, the world's first supercomputer to sustain over 1 gigaflop on many applications. *Multiple 333 MFLOPS processors* powered the system to a

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record sustained speed of 2.3 gigaflops. See "Cray, Inc. History" at

http://www.cray.com/company/history.html. For further reading on **multiprocessor**

UNIX systems, see MAURICE J. BACH, THE DESIGN OF THE UNIX OPERATING SYSTEM, 391-

411, 1986. Specifically, section 12.2 of Bach, pp. 393-395, describes a solution for a

multiple processor system where processes, e.g. a plurality of instructions, are

scheduled onto two different processors based on a scheduling algorithm.

Thus, for at least the reasons set forth above, limitations of claim 24 are

presented in the specification using languages and terminologies at a level that is

consistent with the manner persons skilled in the relevant art present their works to one

another, thereby satisfying at least the enablement requirements of 35 U.S.C. §112, first

paragraph.

Issue II - Claim Group III

Rejection of claims 1-7, 25 and 26 under 35 U.S.C. §102 was improper because such claims are patentable over Ansaldi et al., "Geometric Modeling of Solid Objects By Using a Face Adjacency Graph Representation", Proceedings of the SIGGRAPH '85 conference on Computer Graphics, pp. 131-139, 1985 (hereinafter *Ansaldi*).

Claims 1, 25, and 26, in part, recite the limitations of **replicating a sub-graph**

from a first dependent graph of a first mechanical design of a computer aided

design (CAD) tool and the **merging the replicated sub-graph into a second**

dependent graph of a second mechanical design of the CAD tool to reuse the

subpart of the first mechanical design in the second mechanical design.

In detail, the Examiner has cited page 139, column 1, lines 9-20, and Figure 2(d)

in regards to **replicating** and **merging** a sub-graph. Figure 2(d)'s description, unrelated

to the discussion on page 139, is discussed in the last paragraph of page 133, column

2. The discussion in these passages focuses on joining two faces f and f' belonging **to two different shells** s and s'. That is, shell s and shell s' are different shells. Thus, there is no discussion of *replicating a sub-graph from a dependant graph of a first mechanical design* of a computer aided design (CAD) tool.

Further, lines 9-20 in column 1 of page 139 do not provide further insight with respect replicating and merging a sub-graph. Lines 9-16 discuss the fact that every shell of an object is represented by a different component in its face adjacency graph and that the decomposition of the face adjacency graph allows for recognition of special topological features. Lines 17-20 suggest that the face adjacency graph has been demonstrated to be a valid model in practical applications. Lines 9-20 in column 1 of page 139 says nothing with respect to replicating a sub-graph from a first dependant graph nor does it says anything with respect to merging a replicated sub-graph of a first mechanical design into a second mechanical design. Thus, Appellant respectfully submits that *Ansaldi* does not disclose or suggest **replicating a sub-graph from a first dependent graph of a first mechanical design of a computer aided design (CAD) tool** or the **merging the replicated sub-graph (of the first mechanical design) into a second dependent graph of a second mechanical design of the CAD tool to reuse the subpart of the first mechanical design in the second mechanical design.**

Thus, for at least the reasons set forth above, the present invention is not anticipated by *Ansaldi*, and each of the independent claims 1, 25, and 26 is patentable over *Ansaldi*.

Claims 2-7 depend from independent claim 1 incorporating its limitations. Thus, by virtue of at least their dependency on claim 1, claims 2-7 are patentable over

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Ansaldi. In addition, claims 2-7 include numerous additional limitations that render these claims further patentable over *Ansaldi.*

<u>*Issue III - Claim Group IV*</u>

Rejection of claims 1-2, 25 and 26 under 35 U.S.C. §102 was improper because such claims are patentable over Zeid, Ibrahim. <u>CAD/CAM Theory and Practice</u>, 1991. pp. 388-437, hereinafter *Zeid.*

Claims 1, 25, and 26, in part, recite the limitations of **replicating a sub-graph from a first dependent graph of a first mechanical design of a computer aided design (CAD) tool** and the **merging the replicated sub-graph into a second dependent graph of a second mechanical design of the CAD tool to reuse the subpart of the first mechanical design in the second mechanical design**.

Zeid is cited at 392-393 for teaching **replicating a sub-graph from a first dependent graph of a first mechanical design of a computer aided design (CAD) tool**. *Zeid* however discloses a Constructive Solid Geometry (CSG) graph. A CSG graph is a symbolic representation of, and is intimately related to, the modeling steps used by the user to create a model. Thus, the CSG is useful in creating a typical solid as shown in Figure 7-41 by **graphically representing *the process*** by which primitives of a solid are combined to make the solid. In other words, *Zeid* discloses an efficient data structure, the CSG, to define and edit a solid. *Zeid* does not suggest or disclose **replicating a sub-graph from a first dependent graph of a first mechanical design of a computer aided design (CAD) tool** (for the purpose of reusing the corresponding subpart of the first mechanical design in a second mechanical design, by merging the replicated sub-graph into the dependent graph of the second mechanical design).

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Thus, for at least the reasons set forth above, the present invention is not anticipated by *Zeid*, and each of the independent claims 1, 25, and 26 is patentable over *Zeid*.

Claim 2 depends from independent claim 1 incorporating its limitations. Thus, by virtue of at least its dependency on claim 1, claim 2 is patentable over *Zeid*. In addition, claim 2 includes other limitations that render this claim further patentable over *Zeid*.

Issue IV - Claim Group V

Rejection of claims 8-24 under 35 U.S.C. §103 was improper because such claims are patentable over *Ansaldi* in view of Official Notice.

As part of the basis for the Examiner's rejection of claim 8, the Examiner relies upon the previous argument that "*Ansaldi* teaches the creation and merging of graphs and sub-graphs as described in the claim, as discussed above". The Examiner additionally takes Official Notice that "it would have been obvious and well known to one of ordinary skill in the art to utilize a recordable medium ...".

However, as discussed above, Appellant respectfully submits that *Ansaldi* does not teach **replicating a sub-graph from a first dependent graph of a first mechanical design of a computer aided design (CAD) tool** or the **merging the replicated sub-graph into a second dependent graph of a second mechanical design of the CAD tool to reuse the subpart of the first mechanical design in the second mechanical design.** Thus, *Ansaldi* does not teach the basic elements upon which the 35 U.S.C. §103(a) rejection is based. Assuming, arguendo, that it would have been obvious and well known to one of ordinary skill in the art to utilize a recordable medium, claim 8 is nevertheless not obvious over *Ansaldi* in view of Official Notice as

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the basic elements upon which the rejection is based are not taught by *Ansaldi.* Thus, for at least the reasons set forth above, independent claim 8 is patentable over *Ansaldi* in view of Official Notice.

Claims 9-15 depend from claim 8 incorporating its limitations. Thus, by virtue of at least their dependency on claim 8, claims 9-15 are patentable over *Ansaldi* in view of Official Notice. In addition, claims 9-15 include numerous other limitations that render these claims further patentable over *Ansaldi* in view of Official Notice.

Claims 16-24 stand rejected under 35 U.S.C. §103(a) as being unpatentable over *Ansaldi* in view of Official Notice. As part of the basis for the Examiner's rejection of claim 16, the Examiner relies upon the previous argument that "*Ansaldi* teaches the creation and merging of graphs and sub-graphs as described the claim". The Examiner additionally takes Official Notice that "it would have been obvious and well known to one of ordinary skill in the art to utilize a storage medium ...".

However, as discussed above, Appellant respectfully submits that *Ansaldi* does not teach **replicating a sub-graph from a first dependent graph of a first mechanical design of a computer aided design (CAD) tool** or the **merging the replicated sub-graph into a second dependent graph of a second mechanical design of the CAD tool to reuse the subpart of the first mechanical design in the second mechanical design**. Thus, *Ansaldi* does not teach the basic elements upon which the 35 U.S.C. §103(a) rejection is based. Assuming, arguendo, that it would have been obvious and well known to one of ordinary skill in the art to utilize a storage medium, claim 16 is nevertheless not obvious over *Ansaldi* in view of Official Notice as the basic elements upon which the rejection is based are not taught by *Ansaldi.* Thus,

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for at least the reasons set forth above, independent claim 16 is patentable over *Ansaldi* in view of Offical Notice.

Claims 17-24 depend from claim 16 incorporating its limitations. Thus, by virtue of at least their dependency on claim 16, claims 17-24 are patentable over *Ansaldi* in view of Official Notice. In addition, claims 17-24 include numerous other limitations that render these claims further patentable over *Ansaldi* in view of Official Notice.

Issue V - Claim Group VI

Rejection of claims 8 and 16 under 35 U.S.C. §103 was improper because such claims are patentable over *Zeid* in view of Official Notice.

As part of the basis for the Examiner's rejection of claims 8 and 16, the Examiner relies upon the previous argument that "*Zeid* teaches the creation and merging of graphs and sub-graphs as described the claim". The Examiner additionally takes Official Notice that it would have been obvious and well known to one of ordinary skill in the art to utilize a storage/recordable medium.

However, as discussed above, Appellant respectfully submits that *Zeid* does not teach **replicating a sub-graph from a first dependent graph of a first mechanical design of a computer aided design (CAD) tool** or the **merging the replicated sub-graph into a second dependent graph of a second mechanical design of the CAD tool to reuse the subpart of the first mechanical design in the second mechanical design**. Thus, *Zeid* does not teach the basic elements upon which the 35 U.S.C. §103(a) rejection is based. Assuming, arguendo, that it would have been obvious and well known to one of ordinary skill in the art to utilize a storage/recordable medium, claims 8 and 16 are nevertheless not obvious over *Zeid* in view of Official Notice as the

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basic elements upon which the rejections are based are not taught by *Zeid*. Thus, for at least the reasons set forth above, claims 8 and 16 are patentable over *Zeid* in view of Official Notice.
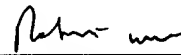
(9) Conclusion

Appellant respectfully submits that all the appealed claims in this application are patentable and requests that the Board of Patent Appeals and Interferences overrule the Examiner and direct allowance of the rejected claims.

This brief is submitted in triplicate, along with a check for $320 to cover the appeal fee for one other than a small entity as specified in 37 C.F.R. §1.17(c). Please charge any shortages and credit any overages to Deposit Account No. 500393.

Respectfully submitted,
Schwabe, Williamson & Wyatt, P.C.

Dated: _15 Apr.   , 2003

Robert Watt
Registration No. 45,890

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APPENDIX A – CLAIMS AS PENDING

1   1. In a computer system, a method of operation comprising:

2   replicating a sub-graph from a first dependent graph of a first mechanical design

3   of a computer aided design (CAD) tool, the first dependent graph having modeling

4   information of the first mechanical design and the replicated sub-graph having modeling

5   information of a subpart of the first mechanical design; and

6   merging the replicated sub-graph into a second dependent graph of a second

7   mechanical design of the CAD tool to reuse the subpart of the first mechanical design in

8   the second mechanical design.

1   2. The method of operation of claim 1 further comprising receiving identification of the

2   subpart of the first mechanical design, and in response, identifying the sub-graph for

3   replication.

1   3. The method of operation of claim 2, wherein

2   said first dependent graph includes a first plurality of nodes correspondingly

3   represent a first plurality of design variables of the first mechanical design, and a first

4   plurality of arcs linking the first plurality of nodes in accordance with the first plurality of

5   design variables' dependency on one another; and

6   said identification of the sub-graph for replication comprises correlating said

7   received identification of the subpart to one or more nodes of said first plurality of nodes

8   directly associated with the subpart, and following applicable ones of said first plurality

9   of arcs to identify all other nodes of said first plurality of nodes to which the directly

10 associated nodes are directly or indirectly dependent on.

1   4. The method of operation of claim 3 wherein said replication comprises copying said

2   directly associated nodes, said nodes on which the directly associated nodes are

3   dependent on, and the arcs linking these nodes to one another.

1   5. The method of operation of claim 4, wherein

2   selected ones of the design variables of said replicated sub-graph are set to

3   constant values, while others are eligible to have values variably assigned; and

4   the method of operation further comprises receiving instructions to transform

5   selected ones of the design variables set to constant values to design variables eligible

6   for having values variably assigned, or to transform selected ones of the design

7   variables eligible for having values variably assigned to having constant values

8   assigned.

1   6. The method of operation of claim 1 further comprising receiving identification of a

2   point or an area of the second mechanical design to reuse the subpart of the first

3   mechanical design in the second mechanical design.

1   7. The method of operation of claim 6, wherein

2   said second dependent graph includes a second plurality of nodes

3   correspondingly represent a second plurality of design variables of the second

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4   mechanical design, and a second plurality of arcs linking the second plurality of nodes

5   in accordance with the second plurality of design variables' dependency on one

6   another; and

7   said merging comprises correlating said received identification of the point/area

8   to one or more nodes of said second plurality of nodes directly associated with the

9   identified point/area, and attaching the replicated sub-graph to the second dependent

10   graph by selectively linking nodes of the replicated sub-graph to the correlated nodes of

11   the second dependent graph.

1   8. An article of manufacture comprising:

2   a recordable medium having recorded thereon a plurality of programming

3   instructions for use to program an apparatus to enable the apparatus to be able to

4   replicate a sub-graph from a first dependent graph of a first mechanical design of a

5   computer aided design (CAD) tool, the first dependent graph having modeling

6   information of the first mechanical design and the replicated sub-graph having modeling

7   information of a subpart of the first mechanical design, and to be able to merge the

8   replicated sub-graph into a second dependent graph of a second mechanical design of

9   the CAD tool to reuse the subpart of the first mechanical design in the second

10   mechanical design.

1   9. The article of claim 8, wherein the programming instructions further enable the

2   apparatus to be able to receive identification of the subpart of the first mechanical

3   design, and in response, identify the sub-graph for replication.

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1   10. The article of claim 9, wherein

2   said first dependent graph includes a first plurality of nodes correspondingly

3   represent a first plurality of design variables of the first mechanical design, and a first

4   plurality of arcs linking the first plurality of nodes in accordance with the first plurality of

5   design variables' dependency on one another; and

6   the programming instructions further enable the apparatus to be able to

7   identify the sub-graph for replication by correlating said received identification to one or

8   more nodes of said first plurality of nodes directly associated with the subpart, and then

9   following applicable ones of said first plurality of arcs to identify all other nodes of said

10   first plurality of nodes to which the directly associated nodes are directly or indirectly

11   dependent on.

1   11. The article of claim 10 wherein the programming instructions further enable the

2   apparatus to be able to replicate the identified sub-graph by copying said directly

3   associated nodes, said nodes the directly associated nodes are dependent on, and the

4   arcs linking these nodes to one another.

1   12. The article of claim 11, wherein

2   selected ones of the design variables of said replicated sub-graph are set to

3   constant values, while others are eligible to have values variably assigned; and

4   the programming instructions further enable the apparatus to be able to

5   receive instructions to transform selected ones of the design variables set to constant

6   values to design variables eligible for having values variably assigned, or to transform

7   selected ones of the design variables eligible for having values variably assigned to

8   having constant values assigned.

1   13. The article of claim 8, wherein the programming instructions further enable the

2   apparatus to be able to receive identification of a point or an area of the second

3   mechanical design to reuse the subpart of the first mechanical design in the second

4   mechanical design.

1   14. The article of claim 13, wherein

2   said second dependent graph includes a second plurality of nodes

3   correspondingly represent a second plurality of design variables of the second

4   mechanical design, and a second plurality of arcs linking the second plurality of nodes

5   in accordance with the second plurality of design variables' dependency on one

6   another; and

7   the programming instructions further enable the apparatus to be able to correlate

8   the received identification of the point/area to one or more nodes of said second

9   plurality of nodes directly associated with the identified point/area, and to attach the

10   replicated sub-graph to the second dependent graph by selectively linking nodes of the

11   replicated sub-graph to the correlated nodes of the second dependent graph.

1   15. The article of claim 8, wherein the programming instructions are integral part of a

2   computer aided design tool.

1   16. An apparatus comprising:

2   at least one storage medium having stored therein a first and a second plurality of

3   programming instructions; and

4   at least one processor coupled to the at least on storage medium to execute the

5   first plurality of programming instructions to replicate a sub-graph from a first dependent

6   graph of a first mechanical design of a computer aided design (CAD) tool, the first

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7　dependent graph having modeling information of the first mechanical design and the

8　replicated sub-graph having modeling information of a subpart of the first mechanical

9　design, and to execute the second plurality of programming instructions to merge the

10　replicated sub-graph into a second dependent graph of a second mechanical design of

11　the CAD tool to reuse the subpart of the first mechanical design in the second

12　mechanical design.

1　17. The apparatus of claim 16, wherein the at least one processor further executes the

2　second plurality of programming instructions to receive identification of the subpart of

3　the first mechanical design, and in response, identify the sub-graph for replication.

1　18. The apparatus of claim 17, wherein

2　　　said first dependent graph includes a first plurality of nodes correspondingly

3　represent a first plurality of design variables of the first mechanical design, and a first

4　plurality of arcs linking the first plurality of nodes in accordance with the first plurality of

5　design variables' dependency on one another; and

6　　　the at least one processor further executes the first plurality of programming

7　instructions to identify the sub-graph for replication by correlating said received

8　identification of the subpart to one or more nodes of said first plurality of nodes directly

9　associated with the identified subpart, and to follow applicable ones of said first plurality

10　of arcs to identify all other nodes of said first plurality of nodes to which the directly

11　associated nodes are directly or indirectly dependent on.

1　19. The apparatus of claim 18 wherein the at least one processor further executes the

2　first plurality of programming instructions to replicate the identified sub-graph by copying

3   said directly associated nodes, said nodes on which the directly associated nodes are

4   dependent on, and the arcs linking the these nodes to one another.

1   20. The apparatus of claim 19, wherein

2   selected ones of the design variables of said replicated sub-graph are set to

3   constant values, while others are eligible to have values variably assigned; and

4   the at least one processor further executes the second plurality of programming

5   instructions to receive instructions to transform selected ones of the design variables set

6   to constant values to design variables eligible for having values variably assigned, or to

7   transform selected ones of the design variables eligible for having values variably

8   assigned to having constant values assigned.

1   21. The apparatus of claim 16, wherein the at least one processor further executes the

2   second plurality of programming instructions to receive identification of a point or an

3   area of the second mechanical design to reuse the subpart of the first mechanical

4   design in the second mechanical design.

1   22. The apparatus of claim 21, wherein

2   said second dependent graph includes a second plurality of nodes

3   correspondingly represent a second plurality of design variables of the second

4   mechanical design, and a second plurality of arcs linking the second plurality of nodes

5   in accordance with the second plurality of design variables' dependency on one

6   another; and

7   the at least one processor further executes the second plurality of programming

8   instructions to correlate the received identification of the point/area to one or more

9   nodes of said second plurality of nodes directly associated with the identified point/area,

10 and to attach the replicated sub-graph to the second dependent graph by selectively

11 linking nodes of the replicated sub-graph to the correlated nodes of the second

12 dependent graph.

1   23. The apparatus of claim 16, wherein the at least one processor consists of a

2   processor executing both the first and second plurality of programming instructions.

1   24. The apparatus of claim 16, wherein the at least one processor comprises a first and

2   a second processor communicatively coupled to each other to correspondingly execute

3   the first and second plurality of programming instructions.

1   25. An apparatus comprising:

2   means to replicate a subset of a first modeling representation of a first

3   mechanical design responsive to instructions identifying a subpart of the first

4   mechanical design of a computer aided design (CAD) tool; and

5   means to merge the replicated subset into a second modeling representation of a

6   second mechanical design of the CAD tool to reuse the identified subpart of the first

7   mechanical design in the second mechanical design.

1   26. In a computer system, a method of operation comprising the steps of:

2   replicating a subset of a first modeling representation of a first mechanical design

3   of a computer aided design (CAD) tool responsive to instructions identifying a subpart of

4   the first mechanical design; and

5   merging the replicated subset into a second modeling representation of a second

6   mechanical design of the CAD tool to reuse the identified subpart of the first mechanical

7   design in the second mechanical design.

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Attorney's Docket No.: 109869-130041   Patent

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application for:

Kapil D. Singh

Application No.: 09/239,578

Filed: January 28, 1999

For: METHOD AND APPARATUS FOR REUSING SUBPARTS OF ONE MECHANICAL DESIGN FOR ANOTHER MECHANICAL DESIGN

Examiner: Sharon, Ayal I.

Art Group: 2123

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Commissioner for Patents
Washington, DC 20231

DECLARATION UNDER 37 C.F.R. § 1.132

My name is Mark Warren Lambert. I reside at 13090 Princeton Court in the city of Lake Oswego in the state of Oregon. I am an engineer by profession.

I am a person of ordinary skill in the art of computer aided design (CAD). My educational background includes a Masters of Science in Mechanical Engineering from University of California Berkeley, a Bachelors of Science in Computer Science from Washington State University, and a Bachelors of Science in Mechanical Engineering from Washington State University. My work history includes 17 years as an engineer including 7 years as a CAD software developer.

I have read the disclosure contained in the patent application titled "Method and Apparatus for Reusing Subparts of One Mechanical Design for Another Mechanical Design". Based on this disclosure, at the time of the filing of this application, I would have been able to replicate a sub-graph (page 11 lines 4-7) from a dependent graph of a mechanical design. Furthermore, at the time of the filing of this application as a result of the disclosure, I would be able to merge the replicated sub-graph (see claim 1 and

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page 11 lines 13-15) into a second dependant graph of another mechanical design. I would have been able to perform both of these tasks without having to perform further experimentation.

In addition, at the time of the filing of this application, after having read the above referenced patent application, I would have been able to determine how to identify the sub-graph for replication (see claim 2 and page 11, lines 11-13) after receiving identification of a subpart of a mechanical design. I would have been able to perform this task without having to perform further experimentation.

And lastly, at the time of the filing of this application, after having read the above referenced patent application, I would be able to determine how to have two sets of code, one for the replication of the first sub-graph and the second for merging the replicated sub-graph into the other mechanical design; with the first set running on one processor and the second running on different processor (see claim 24 and page 13 lines 22-24). I would have been able to perform this task without having to perform further experimentation.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine, imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date: 1/21/03

Mark Warren Lambert

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